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EXAMINER	
GEBRESILASSIE, KIBROM K	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/966,121	WALACAVAGE ET AL.	
	Examiner	Art Unit	
	Kibrom K. Gebresilassie	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the amended application filed on June 16, 2006.

2. Claims 1-19 are rejected.

Response to Arguments

3. Regarding Applicant's response to 101 rejection: Applicants amended Claims 1, and 11 to recite the use of computer in performing the method of emulation. This language restricts the broadest reasonable interpretation of the claims to the technological art. It is therefore the rejection is withdrawn.

4. Regarding Applicants response to 103 rejection:

a. General Allegation of Patentability: Applicants argument fail to comply with 37 CFR 1.111(b) because they amount to general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

b. Unpersuasive Argument: Applicant's arguments filed June 16, 2006 have been fully considered but they are not persuasive. Applicants argued that the prior arts (Kanai and ThermaView) do not disclose the steps of generating transformational array for mechanical model using a computer, viewing motion of the mechanical model in a motion viewer based on the transformation array using a computer, steps of replicating a motion of mechanical model by generating a PLC code for the motion of the mechanical model if the motion of the mechanical model was acceptable and using the accepted motion of the

mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code.

The examiner is respectfully disagrees. As cited in pervious office action, Kanai clearly discloses:

i. generating **transformational array for mechanical model** using a computer (analogous to "The series snapshots during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9),

ii. viewing **motion of the mechanical model in a motion viewer** based on the transformation array using a computer (analogous to " **The animation effect of the components** can be **achieved by adding the description of 5**. This description can be defined in the ordinarily VRML authoring tools, and the dynamic behavior of the model can **be executed on the most of VRML viewer**." Page 5, right side column, lines 15-19),

iii. steps of replicating a **motion of mechanical model** by generating a **PLC code for the motion of the mechanical model** if the motion of the **mechanical model was acceptable** and using the accepted motion of the mechanical model to **compare the behavior of the PLC code** relative to the accepted motion by playing the PLC code (analogous to "**The control code of PLC is developed** and implemented to the PLC. Input and output signals of the real PLC are connected to the VRML viewer. Co-simulation is **executed by sending and receiving the I/O signals between the PLC and the viewer**. The programmer can **visually check whether**

every components in the equipment are working right." Page 5, left side column, #5, Fig. 3 and Fig. 7, "As a result of co-simulation, the model of the components in the VRML viewer (community-Place Browser) **can be dynamically moved according to the control code in the PLC**." Page 6, left side column, Fig. 9).

c. Arguing Against References Individually: Applicants argued that the prior art Kanai does not disclose a PLC Emulator. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Although Kanai does not teach or disclose a **PLC Emulator explicitly**, he is clearly used **a different kind of PLC Emulator called VRML viewer** which is the programmer can visually check whether every components in the equipment are working right, which is functionally equivalent to the PLC emulator of the invention (See Kanai, page 3, left side column, #5; Fig. 2).

d. Accordingly, the examiner maintains the rejections.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Satoshi Kanai, and Takeshi Kishinami, "A Virtual Verification Environment for the Sequence Control System Using VRML and JAVA", 1999 by ASME, pgs 1-8, herein referred as **Kanai.**

As per Claim 1:

Kanai discloses a method of emulating machine tool behavior for a programmable logic controller logical verification system for manufacturing a motor vehicle (analogous to "VRML-based virtual verification environment of PLC code, and procedures of building models and co-simulation." page 2, right side column, "2.1 Proposed procedures of PLC code verification"), said method comprising the steps of:

constructing a mechanical model using a computer (analogous to "In the co-simulation, models of the system components are built first in the compute, …" page 2, left side column, lines 15-17);

generating transformational arrays for the mechanical model using the computer (analogous to "The series snapshots during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9);

viewing motion of the mechanical model in a motion viewer (analogous to " The animation effect of the components can be achieved by adding the description of 5. This description can be defined in the ordinarily VRML authoring tools, and the dynamic behavior of the model can be executed on the most of VRML viewer." Page 5, right side column, lines 15-19) based on the transformational arrays using the computer (analogous to "The series snapshots

during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9);

determining whether the motion of the mechanical model is acceptable (analogous to "The makers of automated factory components respectively build the model of their component which has geometry and behavior in the VRML format. The pre-fabricated models are stored in public database." Page 2, right side column, "2.1 Proposed procedures of PLC code Verification" #1);

replicating the motion of the mechanical model by generating PLC code for the motion of the mechanical model (analogous to "The control code of PLC is developed and implemented to the PLC. Input and output signals of the real PLC are connected to the VRML viewer. Co-simulation is executed by sending and receiving the I/O signals between the PLC and the viewer." Page 6, left side column; Fig. 2, and Fig. 3); and

using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code (analogous to " Based on the proposed reference model of the components and the implementation method, the model of components including the state transition and geometry, and event routing relation between components where described by using a VRML...." Page 5, right column, "5. An example of co-simulation" lines 1-6; "This co-simulation technique can make testing and debugging processes of the PLC code more reliable." Page 2, left side column, lines 19-21; "The programmer can visually check whether the every components

in the equipment are working right." Page 5, left side column, #5, Fig. 3 and Fig. 7, "As a result of co-simulation, the model of the components in the VRML viewer (community-Place Browser) can be dynamically moved according to the control code in the PLC." Page 6, left side column, lines 22-24; Fig. 9) with a PLC emulator (analogous to "VRML Viewer" page 3, left side column, #5; Fig. 2).

As per Claim 2:

Kanai discloses a method as set forth in claim 1 wherein said of constructing comprises using a mechanical tool design system to construct the mechanical model (analogous to "In the co-simulation, models of the system components are built first in the compute, ..." page 2, left side column, lines 15-17).

As per Claim 3:

Kanai discloses steps of constructing an electromechanical model (analogous to "the code implemented on the programmable Logic Control (PLC) controls various system components such as actuators, sensors, mechanism, pneumatic and electric circuit, operating panels, etc in the equipment. Building the system components in the equipment..." page 1, left side column, "1. Introduction" lines 4-8).

As per Claim 4:

Kanai discloses step of constructing the mechanical model includes binding the electromechanical model to the mechanical model (analogous to "the code implemented on the programmable Logic Control (PLC) controls various system components such as actuators, sensors, mechanism, pneumatic and electric circuit, operating panels, etc in the equipment. Building the system components in the equipment..." page 1, left side

column, “1. Introduction” lines 4-8).

As per Claim 5:

Kanai discloses step of constructing the electromechanical model comprises using a PLC logical verification system to construct the electromechanical model (analogous to “In order to realize visual verification of the PLC code, both 3-D geometry and dynamic behavior in each component must be modeled and implemented in the VRML.” page 4, left side column, under a title “3.2 Reference model of the component” lines 1-3).

As per Claim 6:

Kanai discloses step of generating transformational arrays based on computer aid design (CAD) geometries of the mechanical model (analogous to “The series snapshots during the co-simulation on the VRML viewer.” Page 6, left side column, lines 25-26; fig. 9).

As per Claim 7:

Kanai discloses step of exporting the mechanical model to a control system design system (analogous to “The programmer of the PLC code collect the models of the components from databases of several different makers individually through the network. The collected model imported to a VRML authoring tool.” page 3, left side column, lines 1-4).

As per Claim 8:

Kanai discloses step of constructing a motion file based on the mechanical model (analogous to “The description of dynamic behavior can also added to the 3-D scene by

using JAVA code as an external scripting language." Page 2, right side column, lines 8-10; "3D geometry of the components, their motion behaviors corresponding to the state transition of the component can be easily defined by adding the several standard nodes of VRML in the code." Page 3, right side column, #6) and transformational arrays (analogous to "The series snapshots during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9).

As per Claim 9:

Kanai discloses step of displaying further comprises playing the motion file by motion player (analogous to " The animation effect of the components can be achieved by adding the description of 5. This description can be defined in the ordinarily VRML authoring tools, and the dynamic behavior of the model can be executed on the most of VRML viewer." Page 5, right side column, lines 15-19).

As per Claim 10:

Kanai discloses step of returning to the mechanical tool design system if the motion of the mechanical model is not acceptable (analogous to "..., both 3-D geometry and dynamic behavior in each component must be modeled and be implemented in the VRML." Page 4, left side column, "3.2 Reference model of the component" page 2, right side column, lines 5-14).

As per Claim 11:

Kanai discloses a method of emulating machine tool behavior for a programmable logic controller logical verification system for manufacturing a motor vehicle (analogous to "VRML-based virtual verification environment of PLC code, and

procedures of building models and co-simulation." page 2, right side column, "2.1 Proposed procedures of PLC code verification"), said method comprising the steps of:

constructing a mechanical model using a computer (analogous to "In the co-simulation, models of the system components are built first in the compute, ..." page 2, left side column, lines 15-17);

generating transformational arrays for the mechanical model using the computer (analogous to "The series snapshots during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9);

constructing a motion file based on the mechanical model and the CAD transformational arrays using a computer (analogous to "The description of dynamic behavior can also added to the 3-D scene by using JAVA code as an external scripting language." Page 2, right side column, lines 8-10);

viewing motion of the mechanical model in a motion viewer) (analogous to " The animation effect of the components can be achieved by adding the description of 5. This description can be defined in the ordinarily VRML authoring tools, and the dynamic behavior of the model can be executed on the most of VRML viewer." Page 5, right side column, lines 15-19) based on the transformational arrays using the computer (analogous to "The series snapshots during the co-simulation on the VRML viewer." , page 3, left side column, #5; Fig. 2);

determining whether the motion of the mechanical model is acceptable (analogous to "The makers of automated factory components respectively build

the model of their component which has geometry and behavior in the VRML format. The pre-fabricated models are stored in public database." Page 2, right side column, "2.1 Proposed procedures of PLC code Verification" #1);

replicating the motion of the mechanical model by generating PLC code for the motion of the mechanical model if the motion of the mechanical model was acceptable (analogous to "The control code of PLC is developed and implemented to the PLC. Input and output signals of the real PLC are connected to the VRML viewer. Co-simulation is executed by sending and receiving the I/O signals between the PLC and the viewer." Page 6, left side column; Fig. 2, and Fig. 3); and

using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code (analogous to " Based on the proposed reference model of the components and the implementation method, the model of components including the state transition and geometry, and event routing relation between components where described by using a VRML...." Page 5, right column, "5. An example of co-simulation" lines 1-6; "This co-simulation technique can make testing and debugging processes of the PLC code more reliable." Page 2, left side column, lines 19-21; "The programmer can visually check whether the every components in the equipment are working right." Page 5, left side column, #5, Fig. 3 and Fig. 7, "As a result of co-simulation, the model of the components in the VRML viewer (community-Place Browser) can be dynamically moved according to the control

code in the PLC." Page 6, left side column, Fig. 9) with a PLC Emulator (analogous to "VRML Viewer" , page 3, left side column, #5; Fig. 2).

As per Claim 12:

Kanai discloses a method as set forth in claim 1 wherein said of constructing comprises using a mechanical tool design system to construct the mechanical model (analogous to "In the co-simulation, models of the system components are built first in the compute, ..." page 2, left side column, lines 15-17).

As per Claim 13:

Kanai discloses steps of constructing an electromechanical model (analogous to "the code implemented on the programmable Logic Control (PLC) controls various system components such as actuators, sensors, mechanism, pneumatic and electric circuit, operating panels, etc in the equipment. Building the system components in the equipment..." page 1, left side column, "1. Introduction" lines 4-8).

As per Claim 14:

Kanai discloses step of constructing the mechanical model includes binding the electromechanical model to the mechanical model (analogous to "the code implemented on the programmable Logic Control (PLC) controls various system components such as actuators, sensors, mechanism, pneumatic and electric circuit, operating panels, etc in the equipment. Building the system components in the equipment..." page 1, left side column, "1. Introduction" lines 4-8).

As per Claim 15:

Kanai discloses step of constructing the electromechanical model comprises using a PLC logical verification system to construct the electromechanical model (analogous to "In order to realize visual verification of the PLC code, both 3-D geometry and dynamic behavior in each component must be modeled and implemented in the VRML." page 4, left side column, under a title "3.2 Reference model of the component" lines 1-3).

As per Claim 16:

Kanai discloses step of generating transformational arrays based on computer aid design (CAD) geometries of the mechanical model (analogous to "The series snapshots during the co-simulation on the VRML viewer." Page 6, left side column, lines 25-26; fig. 9).

As per Claim 17:

Kanai discloses step of exporting the mechanical model (analogous to "The programmer of the PLC code collect the models of the components from databases of several different makers individually through the network. The collected model imported to a VRML authoring tool." page 3, left side column, lines 1-4) to the PLC Emulator (analogous to "VRML Viewer" page 3, left side column, #5; Fig. 2).

As per Claim 18:

Kanai discloses step of displaying further comprises playing the motion file by motion player (analogous to " The animation effect of the components can be achieved by adding the description of 5. This description can be defined in the ordinarily VRML

authoring tools, and the dynamic behavior of the model can be executed on the most of VRML viewer." Page 5, right side column, lines 15-19).

As per Claim 19:

Kanai discloses step of returning to the mechanical tool design system if the motion of the mechanical model is not acceptable (analogous to "..., both 3-D geometry and dynamic behavior in each component must be modeled and be implemented in the VRML." Page 4, left side column, "3.2 Reference model of the component" page 2, right side column, lines 5-14).

Conclusion

7. Claims 1-19 are rejected.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jerry Banks, "HANDBOOK OF SIMULATION Principles, Methodology, Advances, Applications, and Practice," 1998 by John Wiley and Sons, Inc.

S. Vedapudi, "Using MCM to do Emulation of a Car Assembly Line" Brooks Automation Symposium '01, pgs 1-4.

W. Dong, F. Palmquist, and S. Lidholm, "A Simple and Effective Emulation Tool Interface Development for Tricept Application" Proceedings of the 33rd ISR October 7-11, 2002.

9. Any inquiring concerning this communication or earlier communication from the examiner should be directed to Kibrom K. Gebresilassie whose telephone number is (571) 272-8571. The examiner can normally be reached on Monday-Friday, 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner supervisor, Kamini shah can be reached at (571) 272-2279. The official fax number is (571) 273-8300. Any inquiring of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is (571) 272-3700.

Kibrom Gebresilassie
Art Unit 2128

KAMINI SHAH
SUPERVISORY PATENT EXAMINER